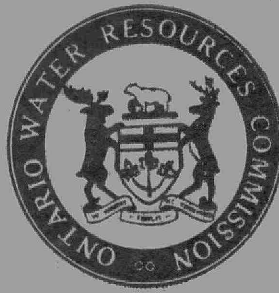


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Water Pollution
Survey

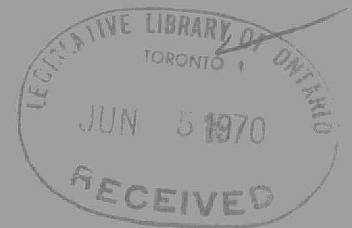
THE
ONTARIO WATER RESOURCES
COMMISSION

WATER POLLUTION SURVEY

of the

HAMLET OF FORMOSA

COUNTY OF BRUCE



1968 - 1969

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R E P O R T

on

WATER POLLUTION SURVEY

of the

HAMLET OF FORMOSA

County of Bruce

Ontario Water Resources Commission

Division of Sanitary Engineering

District Engineers Branch

Date of Sampling - April 25, 1968
July 10, 1968
April 16, 1969.

R E P O R T

ONTARIO WATER RESOURCES COMMISSION

INTRODUCTION

Water pollution surveys were conducted in the Hamlet of Formosa on April 25, 1968, July 10, 1968, and April 16, 1969, in an effort to locate and evaluate all existing sources of pollution. Such surveys are performed routinely and upon request by the OWRC's Division of Sanitary Engineering as a basis for determining water supply and sewage treatment requirements.

Acknowledgement is here given to the following persons who provided assistance and information necessary for the completion of this report.

Dr. D.R. Allen, MOH & Director
Bruce County Health Unit

Mr. W.G. Heisz, Plant Manager
Formosa Spring Brewery Limited

Mr. M. Heisz, Bottle Shop Supervisor
Formosa Spring Brewery Limited

Mr. A. Weiler, Owner
Weiler Lumber Limited

Mr. H. Auckland, Owner
Palace Gardens Park

Mr. N. Stephen, Field Officer
Saugeen Valley Conservation Authority

Mr. H.C. French, Assessment Commissioner
County of Bruce

Mr. B. Ernewein, Owner
Ernewein Produce

I GENERAL INFORMATION

The Hamlet of Formosa is located in the southern portion of the County of Bruce on the border between the Townships of Culross and Carrick. Formosa Creek which flows north-westerly through the community has its source in marshy land, containing willow scrub, north-west of the Village of Mildmay. Its flow westerly to Formosa is through a wide and relatively deep valley, a glacial spillway. Near the southern end of the community the creek flows into a mill pond whose level is controlled by a wooden dam at the Council Road bridge. From Formosa the creek flows generally in a westerly direction and junctures with the Teeswater River at Lot 25, Concession 14, Township of Culross. The Teeswater River in turn discharges into the Saugeen River near Paisley.

According to information received from the Bruce County assessment office, the total population of the hamlet is about 278 persons. Approximately 182 persons are located in the Township of Carrick, with the remaining 96 persons situated in the Township of Culross. Property assessment is valued at \$168,175 and \$119,850 for the Townships of Carrick and Culross respectively, whereas business assessment is estimated at \$36,305 and \$4,215 respectively. Since the community is not incorporated, there is no official plan.

Aside from the usual retail outlets and services, the economy of the community is based on three industries - Formosa Spring Brewery Limited, Weiler Lumber Limited (saw mill), and

Ernewein Produce (turnip processing plant). There is no railway line passing through the area.

The uppermost bedrock in this area of the county is fine grained limestone, magnesium limestone, and dolomite belonging to the Norfolk formation. Just north of the road between Concessions 12 and 13 and on the eastern side of the county road between the Townships of Culross and Carrick up to the creek, the overburden consists of Burford gravelly loam belonging to the Grey-Brown Podzolic great soil group. South of the creek in the Township of Culross and north and south of the creek in the Township of Carrick, the overburden consists of Harriston loam, also belonging to the Grey-Brown Podzolic soil group. In the vicinity of the creek alluvial bottom land of varying composition is located. In the area south of Council Road in the Township of Carrick there are some areas of Duneden clay loam and rock outcrops with soil pockets belonging to the Breypen series. As regards the topography, the hamlet lies in a valley with hilly areas situated to the north and south.

II WATER USES

1. Private Water System

Since ground water is plentiful in the community, each residence has its own well. A good capacity deep drilled artesian well located in Palace Gardens is continuously flowing to waste in Formosa Creek.

2. Recreational Water Uses

Although Formosa Creek does not lend itself to boating or swimming, a limited amount of sports fishing is possible.

3. Agricultural Uses

Since the creek flows predominantly through farmlands from its source to its junction with the Teeswater River, it can be assumed that the watercourse is used for cattle watering.

III WATER POLLUTION

1. Sanitary Waste Disposal

Private septic tank systems are generally used for the disposal of domestic wastes and installations are supervised by the Bruce County Health Unit. Visual evidence during the survey indicated that in general the septic tanks were functioning properly.

2. Industrial Wastes Disposal

(a) Weiler Lumber Limited

This firm is a saw mill operation which cuts and shapes logs. Prior to cutting, the logs are soaked in a hot pond designed to loosen any gravel which would harm the sawing blades. The pond is electrically warmed year round and the sediments, primarily consisting of gravel and soil, are shovelled out twice each year and deposited near the edge of the mill pond. In the spring and fall the liquid in the hot pond is drained into an 8-inch diameter concrete pipe which discharges into Formosa Creek just downstream of the Council Road bridge. An inspection of the shoreline of

the mill pond near the saw mill revealed the presence of gravel, soil, and bark fill both on the land and extending into the water.

(b) Ernewein Produce

This turnip processing plant is owned by Mr. B. Ernewein of Chepstow and operates from mid-August to mid-February of each year. During the season approximately 100,000 bushels of previously trimmed turnips are received at the plant where they are washed, dried, and waxed before shipment. A drilled well having a capacity of about 5 gpm serves as the source of water supply. Based on a washing rate of 800 bushels each 70 minutes, the total amount of washwater produced during the season is in the vicinity of 43,750 gallons. The washwater passes through a settling tank and is directed to a catch basin which empties into a storm sewer draining southerly along the county road between the two townships. This storm sewer discharges into a ditch which flows westerly into Formosa Creek just downstream of Palace Gardens. The settling tank and catch basin are reportedly cleaned of all loam sediments regularly during the operating season. Apparently no other pollution of Formosa Creek except soil turbidity is occurring from this operation.

(c) Formosa Spring Brewery Limited

This company produces beer, ale, and stout and employs 67 persons. The operating schedule varies between the summer peak of six brews per day, six days per week, to the winter low of

four brews per day, five days per week. The maximum of six brews per day cannot be exceeded, since this is the ultimate capacity of the existing plant. No major expansion of the present brewery is contemplated.

In general the process consists of mixing water, barley malt, and malt adjuncts (corn or rice) into a mash which is heated in a pressure cooker in order to convert the insoluble starch into soluble starch, and the soluble malt starch into dextrin and malt sugars. The resulting boiling cooker mash is mixed with the rest of the malt in the mash tub to prepare brewers' wort. After all the required ingredients have been dissolved from the brewing materials, the entire mash is transferred from the mash tub to the lauter or straining tub, where the wort is separated from the insoluble spent grains through a slotted false bottom. Being high in protein, these spent grains are sold to farmers for stock feed. The strained wort from the lauter tub is directed to the brew kettle where it is cooked for approximately three hours, during two of which it is in contact with hops. The purpose of boiling is to concentrate the wort to the desired strength, to sterilize it, to destroy all the enzymes, to coagulate certain proteins, to modify the malty smell of the wort, and to extract the tannin and aroma from the hops which are added during the cooking process. At the end of the cooking process the spent hops are very quickly separated from the boiling wort through a false bottom in the hop jack or

strainer underneath the kettle. These spent hops are subsequently dumped on land for disposal. The wort is cooled in order to allow enough air to be absorbed to facilitate the start of fermentation and to precipitate the protein and hop resins. This cooled liquid is stored in the cold wort tank. The cooled wort is then mixed with selected yeasts and directed to the fermenters where the maltose is converted to carbon dioxide and ethyl alcohol. The carbon dioxide evolved is collected and stored for subsequent use in carbonating the beer. After several days the yeast has settled to the bottom of the tub and the beer is ready to be vatted in cold storage tanks. During cold storage clarification, separation, and precipitation of hard resins and improvement in palatability (mellowing) occur. At the end of 3-6 weeks the beer is carbonated, filtered, and put in kegs, bottles, or cans for shipment.

A drilled well equipped with a 170 gpm pump serves as the source of water supply for the plant. The firm's consulting engineer, Mr. R.R. Parker of Reid, Crowther, and Partners Limited, has catalogued the various water uses as follows:

Industrial Processes	<u>Average</u> (Igcd)
Brewhouse	- 16,000
Bottle Washer	- 18,000
Pasteurizer	- 18,000
Cooling, Condensers, & Compressors	- 12,000
Drinking & Sanitary	- 1,000
Miscellaneous	- <u>7,000</u>
Total Average Daily Consumption	- 72,000

The wastes arising from the entire brewing process have similiary been estimated as follows:

	<u>Average</u> (Igpd)
Process Wastes	
Brewhouse	- 12,000
Bottle Washer	- 18,000
Pasteurizer	- 18,000
Cooling & Condenser Water	- 12,000
Sanitary Sewage	- 1,000
Miscellaneous	- <u>3,000</u>
Total Average Daily Waste Flow	- 64,000

The difference between the average total water consumption and total waste flow is probably due to evaporation from the brew kettle, waste boiler steam, and the water used in the product itself.

At present, the uncontaminated cooling water is discharged directly into a drainage ditch which flows northerly into the Formosa Creek mill pond. The sanitary sewage is disposed of in a septic tank and tile bed system. The remaining process wastes amounting to 51,000 Igpd are combined in one sewer which flows to two concrete settling tanks, each having a capacity of 8250 Imperial gallons. Both tanks are equipped with baffled inlets and stationary scum collectors. Once per week during the summer the collected scum is pumped to a spreader for distribution on farm land. During the winter months the scum is reportedly not removed, and the effluent from the settling tanks is pumped by either of two pumps to a holding pond having a surface area of about 0.25 acres and a depth of 15-20 feet. On occasions during the colder months the effluent has been allowed to overflow from the pumphouse

reservoir directly into a ditch draining into the mill pond.

During the remainder of the year, the effluent is pumped to a single line spray irrigation system fitted with 17 spray heads and located south-east of the plant. Based on a spray area of 34,800 sq. feet or 0.80 acres and a process waste volume of 51,000 Igpd, the average application rate has been estimated at 2.8 inches per day. Even at this high rate there has reportedly been almost no run-off from the spray area which contains steep hill-sides. Apparently the soil is extremely permeable.

Because of a limestone outcrop in the bottom of the holding pond, process wastes have been able to seep into Formosa Creek. During the April 16, 1969 survey it was observed that process wastes were leaching from the holding pond and entering the creek along a few hundred feet of shoreline. Due to the subsequent pollution of the creek, the brewery retained Reid, Crowther, and Partners Limited, Consulting Engineers, to design a more adequate means of process waste disposal. It is now proposed to extend the present spray area from 0.8 to 1.5 acres and to utilize an additional 5 acres of a newly acquired parcel of land having an overall area of 12 acres. Based on a total proposed spray area of 6.5 acres and a process waste volume of 51,000 Igpd, the average application rate will be 7850 gallons per acre per day or 0.35 inches per day. The remainder of the 12 acre area, which is located about 1700 feet south-east of the settling tanks, is to be used for

ridge-and-furrow disposal during the winter months when spray irrigation techniques cannot successfully be employed. At the time of the April 16, 1969 survey it was noted that 17 furrows, each approximately 500-600 feet long and 15 feet apart, had been dug but were not in use. A 3-inch diameter PVC forcemain had also been laid from the pumphouse to the site.

3. Refuse Disposal

There is no municipal refuse disposal site situated within the hamlet. Residents reportedly cart garbage to either of three locations, namely:

- (1) Lot 6, Concession 12, Township of Culross
- (2) Lot 11, Concession 6, Township of Carrick
- (3) Lot 6, Concession 3SDR, Township of Brant

However, there does exist a private dump site just north of Council Road and east of Formosa Creek. This is situated on saw mill property and is only used by Weiler Lumber for refuse disposal. Since run-off from the site can flow to the creek via a ditch, a possibility of polluting the watercourse does exist.

IV ANALYSES RESULTS

1. Terms

Coliforms per 100 ml

Coliform bacteria are commonly found in the intestinal tract of man and animals and in the fecal discharges from these sources. In polluted water their concentration is roughly proportional to the degree of sewage contamination present. The

objective for natural waters is a concentration of not more than 2400 organisms per 100 millilitres.

Biochemical Oxygen Demand

The Biochemical Oxygen Demand (BOD) is a measure of the amount of oxygen required for the stabilization of decomposable organic matter present in sewage. OWRC objectives allow concentrations in natural waters and waste discharges of no greater than 4.0 and 15.0 parts per million (ppm) respectively.

Alkylbenzene Sulphonate

Alkylbenzene Sulphonate (ABS) is a surfactant extensively used in detergents and so is present in domestic sewage at levels averaging about 10 parts per million (ppm). Rivers usually average about 0.1 ppm or less and ground waters range from zero to several parts per million depending upon their proximity to sewage entry points.

2. Discussion

Tables I, II, and III, appended to this report, provide a summary of the results of the chemical analysis and bacteriological examination of the samples collected during the three surveys. The locations of the outfalls and sampling points can be conveniently located on the appended map.

In general the results indicate that the outfalls sampled are not significant sources of pollution to the creek and its tributaries. However, the concentration of pollutants in the seepage

from the holding pond was of sufficient strength to be a source of substantial pollution to the watercourse. The sludge sample collected from the mill pond shoreline was an evidence of the direct entrance of process wastes to the creek. Such spills as this one which occurred in July, 1968, resulted in the lowering of the dissolved oxygen concentration in the water flowing over the weir boards at the Council Road bridge to 0 ppm. This in turn killed some fish in Formosa Creek, especially in the neighbourhood of the Palace Gardens picnic area.

V SUMMARY

On April 25 and July 10, 1968 and April 16, 1969, water pollution surveys were conducted in the Hamlet of Formosa. The results of analyses and field observations indicate that little if any pollution of Formosa Creek was occurring from domestic sources. Of the three industries in the community, the process wastes from Formosa Spring Brewery Limited appeared to have the most adverse effect on the watercourse. Because substantial amounts of process wastes were seeping through the bottom of the plant's holding pond, the brewery plans to abandon it for winter storage purposes. Rather, use will be made of a ridge-and-furrow system in winter months and spray irrigation techniques over a larger area of land during the remainder of the year.

The presence of bark fill on the shoreline of the mill pond was also a potential source of pollution. If the purpose of the fill is to reclaim a portion of shoreline land, then the limits of such fill operations should be set, and upon completion,

some sort of erosion protection should be constructed upon the face of the fill. In addition, since run-off from the saw mill's refuse disposal site north-east of the Council Road bridge can flow to the creek, a dyke should be constructed to impound such run-off waters and so reduce the possibility of pollution.

VI RECOMMENDATIONS

It is recommended that:

1. Formosa Spring Brewery Limited employ the proposed expanded spray area this summer and have the ridge-and-furrow system ready for use by the end of the 1969 spraying season.
2. Weiler Lumber Limited provide erosion protection for the face of the bark fill along the shoreline of the mill pond and construct a dyke for the impounding of run-off waters from its refuse disposal site.

/ek

Prepared by

W.D. Manson
W.D. Manson, Engineer
Division of Sanitary Engineering.

TABLE I

HAMLET OF FORMOSA

WATER POLLUTION SURVEY

ANALYSIS RESULTS

(DATE - APRIL 25, 1968)

SAMPLING POINT NUMBER	DESCRIPTION	5-DAY BOD	SOLIDS			ANIONIC DETERGENTS AS ABS	NITROGEN AS N				TOTAL COLIFORMS PER 100 ML
			TOTAL	SUSP.	DISS		FREE AMMONIA	TOTAL KJELDAHL	NITRITE	NITRATE	
1.	FORMOSA CREEK UPSTREAM OF HAMLET (CONC.B, LOT 29)		NO SAMPLE COLLECTED								
2.	FORMOSA CREEK JUST UPSTREAM OF BREWERY STORAGE POND	6.5	328	10	318	0.0	0.05	-	-	0.68	700
3.	FORMOSA CREEK AT ENTRANCE TO MILL POND		NO SAMPLE COLLECTED								
4.	18-INCH DIAMETER CONC. STORM OUTFALL TO MILL POND		NO SAMPLE COLLECTED								
5.	12-INCH DIAMETER CONC. STORM OUTFALL TO MILL POND	3.8	576	212	364	0.2	0.17	-	-	0.68	12,800
6.	DITCH-UPSTREAM OF BREWERY AND FEED LOT		NO SAMPLE COLLECTED								
7.	DITCH-DOWNSTREAM OF FEED LOT BUT UPSTREAM OF BREWERY	0.6	370	11	359	0.0	0.07	-	-	1.98	76
7(A)	DITCH - ADJACENT BREWERY		NO SAMPLE COLLECTED								
8.	SMALL DITCH BETWEEN BREWERY AND SAWMILL	1.1	396	10	386	0	0.05	-	-	1.82	72
9.	DITCH - ENTRANCE TO MILL POND		NO SAMPLE COLLECTED								
10.	MILL POND NEAR DITCH OUTLET	5.2	378	10	368	0	0.05	-	-	1.61	336

(DATE - APRIL 25, 1968)

SAMPLING POINT NUMBER	DESCRIPTION	5-DAY BOD	SOLIDS			ANIONIC DETERGENTS AS ABS	NITROGEN AS N				TOTAL COLIFORMS PER 100 ML
			TOTAL	SUSP.	DISS.		FREE AMMONIA	TOTAL KJELDAHL	NITRITE	NITRATE	
21.	24-INCH DIAMETER CONC. OUTFALL TO DITCH NORTH OF PALACE GARDENS		NO SAMPLE COLLECTED								
22.	DRAIN FROM MEMORIAL HALL	2.1	404	16	388	0.0	0.61	-	=	2.7	38,000
23.	FORMOSA CREEK DOWNSTREAM OF DITCH	1.7	312	8	304	0.0	0.06	-	=	0.80	600
A	CONTENTS OF BREWERY STORAGE POND		NO SAMPLE COLLECTED								
B	LEACH FROM BREWERY STORAGE POND	210	862	80	782	0.0	4.20	-	=	0.06	=
C	SLUDGE ON EAST SHORE OF MILL POND		NONE PRESENT DURING SAMPLING								

TABLE II

HAMLET OF FORMOSA

WATER POLLUTION SURVEY

ANALYSIS RESULTS

(DATE - JULY 10, 1968)

SAMPLING POINT NUMBER	DESCRIPTION	5-DAY BOD	SOLIDS			ANIONIC DETERGENTS AS ABS	PHENOLS (PPB)	TOTAL COLIFORMS PER 100 ML
			TOTAL	SUSP.	DISS.			
1.	FORMOSA CREEK UPSTREAM OF HAMLET (CONC. B, LOT 29)	3.3	322	10	312	0.0	0	650
2.	FORMOSA CREEK JUST UPSTREAM OF BREWERY STORAGE POND	1.7	318	5	313	0.0	8	8100
3.	FORMOSA CREEK AT ENTRANCE TO MILL POND		NO SAMPLE COLLECTED					
4.	18-INCH DIAMETER CONC. STORM OUTFALL TO MILL POND		NO SAMPLE COLLECTED					
5.	12-INCH DIAMETER CONC. STORM OUTFALL TO MILL POND	8.4	424	22	402	0.1	10	1,240,000
6.	DITCH - UPSTREAM OF BREWERY AND FEED LOT		NO SAMPLE COLLECTED					
7.	DITCH - DOWNSTREAM OF FEED LOT BUT UPSTREAM OF BREWERY		NO SAMPLE COLLECTED					
7(A)	DITCH - ADJACENT BREWERY	11	308	19	289	0.0	0	2,400,000
8.	SMALL DITCH BETWEEN BREWERY AND SAW MILL		NO SAMPLE COLLECTED					
9.	DITCH - ENTRANCE TO MILL POND		NO SAMPLE COLLECTED					
10.	MILL POND NEAR DITCH OUTLET	8.0	500	31	469	0.2	0	1,000
11.	FORMOSA CREEK AT COUNCIL RD. BRIDGE	14	326	13	314	0.1	2	1,710,000
12.	9-INCH DIAMETER CONC. OUT- FALL DOWNSTREAM OF COUNCIL RD. BRIDGE	4.4	394	33	361	0.1	4	85,000

TABLE II

HAMLET OF FORMOSA

WATER POLLUTION SURVEY

ANALYSIS RESULTS

(DATE - JULY 10, 1968)

SAMPLING POINT NUMBER	DESCRIPTION	5-DAY BOD	SOLIDS			ANIONIC DETERGENTS AS ABS	PHENOLS (PPB)	TOTAL COLIFORMS PER 100 ML
			TOTAL	SUSP.	DISS.			
1.	FORMOSA CREEK UPSTREAM OF HAMLET (CONC. B, LOT 29)	3.3	322	10	312	0.0	0	650
2.	FORMOSA CREEK JUST UPSTREAM OF BREWERY STORAGE POND	1.7	318	5	313	0.0	8	8100
3.	FORMOSA CREEK AT ENTRANCE TO MILL POND		NO SAMPLE COLLECTED					
4.	18-INCH DIAMETER CONC. STORM OUTFALL TO MILL POND		NO SAMPLE COLLECTED					
5.	12-INCH DIAMETER CONC. STORM OUTFALL TO MILL POND	8.4	424	22	402	0.1	10	1,240,000
6.	DITCH - UPSTREAM OF BREWERY AND FEED LOT		NO SAMPLE COLLECTED					
7.	DITCH - DOWNSTREAM OF FEED LOT BUT UPSTREAM OF BREWERY		NO SAMPLE COLLECTED					
7(A)	DITCH - ADJACENT BREWERY	11	308	19	289	0.0	0	2,400,000
8.	SMALL DITCH BETWEEN BREWERY AND SAW MILL		NO SAMPLE COLLECTED					
9.	DITCH - ENTRANCE TO MILL POND		NO SAMPLE COLLECTED					
10.	MILL POND NEAR DITCH OUTLET	8.0	500	31	469	0.2	0	1,000
11.	FORMOSA CREEK AT COUNCIL RD. BRIDGE	14	326	13	314	0.1	2	1,710,000
12.	9-INCH DIAMETER CONC. OUT- FALL DOWNSTREAM OF COUNCIL RD. BRIDGE	4.4	394	33	361	0.1	4	85,000

TABLE II - CONT'D.

HAMLET OF FORMOSAWATER POLLUTION SURVEYANALYSIS RESULTS

(DATE - JULY 10, 1968)

SAMPLING POINT NUMBER	DESCRIPTION	5-DAY BOD	SOLIDS			ANIONIC	PHENOLS (PPB)	TOTAL COLIFORMS
			TOTAL	SUSP.	DISS.	DETERGENTS AS ABS		PER 100 ML
13.	6-INCH DIAMETER CONC. OUT- FALL DOWNSTREAM OF COUNCIL RD. BRIDGE		DRY					
14.	6-INCH DIAMETER CORRUGATED IRON OUTFALL UPSTREAM OF TOWNLINE BRIDGE		No SAMPLE COLLECTED					
15.	FORMOSA CREEK AT TOWNLINE BRIDGE	9.6	340	11	329	0.2	3	150,000
16.	14-INCH DIAMETER CONC. OUT- FALL FROM KUNTZ FARM		No SAMPLE COLLECTED					
17.	4-INCH DIAMETER VITRIFIED CLAY OUTFALL FROM KUNTZ FARM		No SAMPLE COLLECTED					
18.	6-INCH DIAMETER CORRUGATED IRON DRAIN FROM BLATCHER'S FEEDS		DRY					
19.	DITCH-42-INCH DIAMETER CORRUGATED IRON CULVERT AT TOWNLINE RD.	0.8	316	3	313	0.0	0	1,900
20.	FORMOSA CREEK DOWNSTREAM OF DITCH AT ENTRANCE TO PALACE GARDENS	35	706	337	369	0.1	2	110,000
21.	24-INCH DIAMETER CONC. OUTFALL TO DITCH NORTH OF PALACE GARDENS		No SAMPLE COLLECTED					
22.	DRAIN FROM MEMORIAL HALL	1.8	390	3	387	0.2	0	10,900,000
23.	FORMOSA CREEK DOWNSTREAM OF DITCH	3.8	314	13	301	0.1	0	970,000
A.	CONTENTS OF BREWERY STORAGE POND	440	810	123	687	0.5	8	54,000,000
B.	LEACH FROM BREWERY STORAGE POND		No SAMPLE COLLECTED					
C.	SLUDGE ON EAST SHORE OF MILL POND	240	50,050	49,720	330	0.1	8	-

TABLE III

HAMLET OF FORMOSA

WATER POLLUTION SURVEY

ANALYSIS RESULTS

(DATE - APRIL 16, 1969)

SAMPLING POINT NUMBER	DESCRIPTION	5-DAY BOD	SOLIDS			ANIONIC DETERGENTS AS ABS	NITROGEN AS N				TOTAL COLIFORMS PER 100ML
			TOTAL	SUSP.	DISS.		FREE AMMONIA	TOTAL KJELDAHL	NITRITE	NITRATE	
1.	FORMOSA CREEK UPSTREAM OF HAMLET (CONC.B, LOT 29)		NO SAMPLE COLLECTED								
2.	FORMOSA CREEK JUST UPSTREAM OF BREWERY STORAGE POND	1.0	270	4	266	0.1	0.5	0.9	0.03	0.52	20
3.	FORMOSA CREEK AT ENTRANCE TO MILL POND	1.2	290	10	280	0.1	0.5	1.3	0.03	0.49	75,000
4.	18-INCH DIAMETER CONC. STORM OUTFALL TO MILL POND	3.0	450	1	449	1.0	2.0	3.3	0.09	1.7	21,000
5.	12-INCH DIAMETER CONC. STORM OUTFALL TO MILL POND	1.0	610	30	580	0.1	0.5	1.8	0.03	2.3	560
6.	DITCH - UPSTREAM OF BREWERY AND FEED LOT	1.6	260	2	258	0.1	0.5	1.3	0.02	0.88	4
7.	DITCH - DOWNSTREAM OF FEED LOT BUT UPSTREAM OF BREWERY		NO SAMPLE COLLECTED								
7(A)	DITCH - ADJACENT BREWERY		NO SAMPLE COLLECTED								
8.	SMALL DITCH BETWEEN BREWERY AND SAWMILL		NO SAMPLE COLLECTED								
9.	DITCH - ENTRANCE TO MILL POND	1.4	270	5	265	0.1	0.3	1.2	0.02	0.83	140
10.	MILL POND NEAR DITCH OUTLET		NO SAMPLE COLLECTED								
11.	FORMOSA CREEK AT COUNCIL RD. BRIDGE	1.0	270	5	265	0.1	0.3	1.4	0.02	0.58	6,000
12.	8-INCH DIAMETER CONC. OUTFALL DOWNSTREAM OF COUNCIL RD. BRIDGE	2.4	340	4	336	0.1	0.3	1.4	0.02	1.1	< 4
13.	6-INCH DIAMETER CONC. OUTFALL DOWNSTREAM OF COUNCIL RD. BRIDGE		DRY								

(CONT'D.)

HAMLET OF FORMOSA

WATER POLLUTION SURVEY

ANALYSIS RESULTS

(DATE - APRIL 16, 1969)

SAMPLING POINT NUMBER	DESCRIPTION	5-DAY BOD	SOLIDS			ANIONIC DETERGENTS AS ABS	NITROGEN AS N				TOTAL COLIFORMS PER 100 ML
			TOTAL	SUSP.	DISS.		FREE AMMONIA	TOTAL KJELDAHL	NITRITE	NITRATE	
14.	6-INCH DIAMETER CORRUGATED IRON OUTFALL UPSTREAM OF TOWNLIN BRIDGE	1.8	320	1	319	0.1	1.5	2.9	0.11	2.1	30,000
15.	FORMOSA CREEK AT TOWNLIN BRIDGE		SAMPLE BROKEN IN TRANSIT								
16.	14-INCH DIAMETER CONC. OUTFALL FROM KUNTZ FARM		NO SAMPLE COLLECTED								
17.	4-INCH DIAMETER VITRIFIED CLAY OUTFALL FROM KUNTZ FARM		NO SAMPLE COLLECTED								
18.	6-INCH DIAMETER CORRUGATED IRON DRAIN FROM BLATCHER'S FEEDS		NO SAMPLE COLLECTED								
19.	DITCH - 42-INCH DIAMETER CORRUGATED IRON CULVERT AT TOWNLIN RD.	0.6	320	1	319	0.1	0.3	1.1	0.02	1.5	108
20.	FORMOSA CREEK DOWNSTREAM OF DITCH AT ENTRANCE TO PALACE GARDENS	0.8	290	20	270	0.1	0.3	1.6	0.03	0.69	1,400
21.	24-INCH DIAMETER CONC. OUTFALL TO DITCH NORTH OF PALACE GARDENS	0.6	290	1	289	0.1	1.0	1.8	0.06	1.9	12,000
22.	DRAIN FROM MEMORIAL HALL		DRY								
23.	FORMOSA CREEK DOWNSTREAM OF DITCH	0.8	310	6	304	0.1	0.3	1.2	0.03	0.02	1,300
A.	CONTENTS OF BREWERY STORAGE POND		NO SAMPLE COLLECTED								
B.	LEACH FROM BREWERY STORAGE POND		NO SAMPLE COLLECTED								
C.	SLUDGE ON EAST SHORE OF MILL POND		NONE PRESENT DURING SAMPLING								



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